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INTELLIGENCE BRIEF

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[redacted] LOOK AT THE SOVIET MACHINE TOOL INDUSTRY

DIRECTORATE OF INTELLIGENCE
Office of Research and Reports

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[redacted] LOOK
AT THE SOVIET MACHINE TOOL INDUSTRY

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[redacted]
has concluded that although the Soviet machine tool industry has made remarkable progress in the past decade and is outproducing the US by more than 3 to 1, it still lags in certain aspects of design and quality.

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Soviet officials told [redacted] that the industry's high output -- heavily weighted toward mass-produced, standardized, general-purpose machines -- is required to equip new plants, provide replacements, and to maintain a machine tool inventory of low average age. Imperfect workmanship and less modern designs, however, make the Soviet machine tool inventory less productive than that of the US.

Although the rate of growth of the Soviet machine tool industry has declined in recent years, it is still growing. The industry has now reached a plateau, however, where easy and inexpensive gains are no longer possible merely by "borrowing" Western technology. Future advances will be facilitated by the correcting of specific shortcomings, the valuable experience in mass production gained in the past, and a combination of good design talents and good managerial practices -- including, perhaps, a wider application of the Liberman proposals.

1. Machine Tool Production

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Based on the scale of production observed in the plants [redacted] believes that there is little reason to doubt that the USSR is actually producing the very large numbers of machine tools it has been reporting. In addition, Soviet output data are comparable to those of the US in that the great bulk of production includes only types that sell for more than US $1,000 and are intended for industrial use. The tabulation below shows that the rate of growth of output of Soviet machine tools has declined in recent years. [redacted] believes, however, that the slowdown in growth has been more than offset by improvements in quality.

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Year	Production of Metalcutting Machine Tools (Units)	Percent Increase over the Previous Year
1961	165,772	6.3
1962	176,908	6.7
1963	182,817	3.3
1964	184,000	0.6
1965 (Plan)	190,000 to 200,000	3.3 (Based on the lower limit of the range)

25X1X The output of the Soviet machine tool industry is heavily weighted toward mass-produced, standardized, general-purpose items. Unlike the US, where all machine tools are produced in relatively small batches using job shop techniques, the USSR uses specialized machines to produce components and conveyorized flow lines to assemble general-purpose machines. In the Moscow Red Proletariat Plant alone, 13,000 engine lathes of one model were mass produced during 1964, whereas in the US during the same year only 12,000 lathes of all types were produced. [redacted] also was impressed by the wide variation between Soviet plants, which include on the one hand a radial drill shop in an Odessa plant which produces machines of obsolete design under unbelievably crowded and dirty conditions and on the other hand a gear machinery plant in Yegoryevsk (near Moscow) which produces well designed equipment in shops comparable to those of a good US plant.

25X1X The Soviet authorities explained their high output of machine tools [redacted] by maintaining that a high output is needed "to equip the three plants opening each day in the USSR" and by citing their replacement requirements and their desire to maintain an inventory of machine tools of low average age. However, the Soviet machine tool industry uses manufacturing procedures and workmanship techniques that are below US standards, and produces designs that lack the most modern features. As a consequence, Soviet machine tools and the machine tool inventory as a whole are rendered less productive than that of the US. Furthermore, [redacted] stated that the general shortage of spare parts and efficient service facilities throughout the Soviet economy inflates the demand for general-purpose machine tools for use in the relatively less productive tool and repair shops attached to nearly all Soviet industrial plants. 25X1X

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2. Design and Quality

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25X1X [redacted] the Soviet experts freely confirmed [redacted] observation that Soviet machine tools were generally inferior to their US and Swiss counterparts in both design and workmanship. Furthermore, the Soviet authorities admitted that they had set the achievement of US standards in the industry as their goal, and they 25X1X
25X1X claimed that 15,000 engineers and designers were engaged in a massive design and development effort to accomplish this purpose. [redacted] were impressed by the high level of competence of the engineers and designers with whom they came in contact and by the substantial advances they had made in the past decade. Certain Soviet machines currently being designed -- to be introduced in the next few years -- were described as "excellent." ENIMS, a large centralized institute for designing machine tools that exerts a substantial degree of control over the machine tool industry, has designed electrodischarge and ultrasonic machines that are reported to be as good as or better than similar US machines. Transfer lines destined for the motor vehicle industry were on a par with what is available in the US. Soviet numerical control -- a system of programed machining well suited to medium-sized production runs -- remains in the prototype stage, 8 to 10 years behind the US, largely because of emphasis on machines of the mass production type.

In general, the quality of Soviet special-purpose machines, which represent a relatively small share of output compared with that in the US, is superior to that of the mass-produced general-purpose machines. The deficiencies in the quality of the Soviet machines appear to be due more to sloppy workmanship in the manufacturing process than to faulty design. Durability of the machines is reduced by the presence of dirt and chips in headstocks, rough handling of parts in process, and inadequate in-process and final inspection techniques. Designs, although not as modern as those of the US, were described as "adequate." In some cases, failure to harden bedways made the machines less durable, and a smaller selection of feed rates and spindle speeds lowered their versatility.

3. Management and Incentives 25X1X

[redacted] were unanimous in their opinion about the high level of competence and skill of the managers of Soviet machine
25X1X tool plants. [redacted] felt that most Soviet plant directors would be able to step into equivalent positions in US industry with no difficulty.

Impressive managerial and design talent has been and will continue to be a vital factor in the drive by the Soviet machine tool industry to raise its quality to world standards. Improvements are needed, however, in the level of skill and versatility of shop workmen. 25X1X

[redacted] was briefed on the Liberman reform proposals, under which plant "profitability" is the major determinant of successful performance. Soviet officials stated that the controversial proposals were being studied seriously and that four Ukrainian plants, including two machine building plants, were using the system on an experimental basis. Soviet plant directors admitted that profits were becoming increasingly important, one director remarking that in the machine tool industry the profit plan was as important as the output plan. [redacted] believed that increased emphasis on the profit incentive could inspire meaningful cost-reducing innovations in the Soviet machine tool industry. On the other hand, it is clear from the overall observations [redacted] that Soviet industry does not yet have the incentives of US industry to interrupt and sacrifice present production in order to modernize production facilities and/or product design. 25X1X 25X1X

4. Prospects 25X1X 25X1X

The Soviet machine tool industry is still growing. Although [redacted] did not learn of any important new plants being built, [redacted] did observe new construction and modernization at nearly every plant visited. Twenty-two large shops, many of which feature controlled environment, are being constructed at existing plants to produce high-precision machines. Soviet officials maintain that output of metal-cutting machine tools will have to be expanded even further over the next 20 years to meet the requirements of new investment and replacement. 25X1X

The observations and conclusions [redacted] on the Soviet machine tool industry are generally consistent with the analysis of this Office. Long a front runner in the Soviet development scheme, the industry is now approaching a plateau where easy and inexpensive gains are no longer possible by "borrowing" Western technology. There are, of course, many advanced, specialized Western designs which the USSR is technologically capable of borrowing, but many of these designs are not particularly useful to the USSR, given the present Soviet industrial product mix and the Soviet system of managing and allocating industrial resources. For example, the relatively

small Soviet automobile industry does not require many of the expensive, highly specialized machine tools that can be economically used in the US automobile industry with its huge production runs.

As for the next 5 or 10 years, a combination of good managerial and design talent, valuable mass-production experience gained in the past decade, and special attention directed to specific shortcomings should guarantee that the impressive progress of the past few years will be continued. Whether the industry reaches the already high and continually advancing standards of the US machine tool industry in this period will depend on the ability of the Soviet system as a whole to develop and assimilate rapidly new technological innovations.

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